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A Proposed Study of Contributions in Agile Systems Development: Research in Progress

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Research In Progress

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ABSTRACT

This study examines contribution behaviours during decision-making in agile systems development projects. Research has indicated that generating alternatives during decision-making is of critical importance and because information is spread across a spectrum of stakeholders in ISD it is important that contributions are extracted from individuals and combined effectively to make informed decisions. Specifically, in agile systems development methods, the practices must encourage and effectively manage contributions during decision-making. The purpose of this study is to assess how agile practices impact contribution behaviours and the subsequent generation of alternatives during decision-making in agile systems development.

Keywords

Agile Systems Development, Contribution Behaviours, Decision Making

INTRODUCTION

Research has shown that effective decision making is a critical component of organisational success where “high quality decisions are expected to lead to more productive actions, quicker problem solving and better organizational performance” (Eierman, Niederman and Adams, 1995). The success of managers and leaders can hinge on the quality of their decision making (Garvin and Roberto 2001) where the generation of alternatives during decision making “is widely regarded as critical” (Pomerol and Adam 2006). Such alternative-generation in ISD is of particular importance because much information is held across a wide spectrum of stakeholders having diverse skill sets. Alternatives can only be generated when individuals across the project team contribute information in order to inform decision-making.

Decision-making in organizations has been a topic of interest to researchers for many years and it is generally recognized that generating alternatives during decision-making is of critical importance in ensuring a quality decision can be reached. One of the most critical resources for achieving decision quality is information where “alternatives must be generated and evaluated” and the use of “relevant information and expertise by participants in the decision process” is necessary (Vroom and Yetton 1973). The exposure of such information particularly in ISD can only be achieved through contribution behaviours because specific, relevant information for decision making is held across a team of business users, analysts, designers and developers. An interesting facet of agile systems development that makes it “unique among IS development methodologies is its inherent philosophy on decision making by project teams” (McAvoy and Butler 2009). Agile teams are self-organising and have the autonomy to

make decisions where the team shares decision responsibility jointly. While generating alternatives for decision making is critical, in agile systems development, "decision making time is a critical success factor in attaining agility" (Batra, Xia, VanderMeer and Dutta, 2010). Despite the need for fast decision making in agile projects, it is well advocated in general decision making literature that "much time may be required to make an accurate decision between alternatives, because gathering, processing and evaluating information may be a lengthy process" (Franks, Dornhaus, Fitzsimmons and Stevens, 2003). Time pressure demands, particularly in agile projects may not always allow for the maximum generation of decision alternatives and therefore impact decision quality. A significant trade-off between speed and accuracy in decision making becomes evident (Franks et al. 2003). Generating alternatives under such circumstances will require the agile team to actively engage in contribution behaviours during the decision making process where agile practices themselves must effectively facilitate such contributions.

RESEARCH OBJECTIVE AND QUESTIONS

The importance of effective decision-making in organizations is widely recognized and studied. Research on agile systems development is still growing yet little is known about decision making in agile ISD projects where there are a number of level of complexities associated agile teams and their decision making and to add to such complexity there is a "noticeable dearth of research on the socio-psychological forces that influence decisions taken by team members and on the outcomes of such decisions" (McAvoy and Butler 2009). This research hopes to contribute to previous work on decision making in agile systems development by investigating contribution behaviours for generating decision alternatives during decision-making. Research questions pertaining to this study include:

Q1. How do agile practices impact decision-making?

Q2. What contribution behaviours occur during the generation of decision alternatives in agile systems development?

Q3. How do agile practices facilitate contribution behaviours in order to generate alternatives during decision-making?

This research-in-progress paper focuses on contribution behaviours that generate alternatives during decision-making in agile systems development with an aim of understanding how agile practices facilitate such contribution behaviours.

AGILE SYSTEMS DEVELOPMENT

One of the most recent and significant contending IS methodological approaches is that of agile systems development. Agile development emerged as a result of continued pressure for "radical change in the traditional approach to development" whereby the "traditional life-cycle approaches that result in the eventual delivery of systems after several years" were no longer appropriate (Fitzgerald 1998). It was increasingly recognised that projects were "still over budget and behind schedule in far more cases than IS professionals and management" found acceptable (Kweku Ewusi-Mensan 1997). As a result, ISD saw further "suggestions for improvement" from "experienced practitioners who have labeled their methods agile software development" (Dyba and Dingsoyr 2008). Agility (as it relates to ISD) can be defined as "iterative and evolutionary in development, planning and delivery to allow for rapid and flexible response to changes" (Batra et al. 2010). The Manifesto for Agile Software Development outlines a clear set of principles and beliefs underpinning agile methodologies (Williams and Cockburn 2003; Batra et al. 2010) as follows:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

Agile places increasing emphasis on personal communication, community, morale, talent, skill and individual competency (Cockburn and Highsmith 2001) and they "derive much of their agility by relying on the tacit knowledge embodied in the team, rather than writing the knowledge down in plans" (Boehm 2002). There are several agile methods utilised in practice and a detailed analysis of all methods is beyond the scope of this research. For the purpose of this research two of the most popular and widely adopted agile methodologies will be explored, which

according to many researchers (e.g. Karlsson, Andersson and Leion 2000; Salo and Abrahamsson 2008; Batra et al. 2010) are XP and Scrum. Scrum provides "an agile approach for managing software projects while increasing the probability of successful development of software, whereas XP focuses more on the project level activities of implementing software" (Salo and Abrahamsson 2008). Both methodologies contain a detailed list of practices, which are presented in Tables 1 and 2.

	Practices	**Description**
1.	Planning Game	Quickly determine the scope of the next release by combining business priorities and technical estimates. As reality overtakes the plan, update the plan
2.	Small Releases	Put a simple system into production quickly, then release new versions on a very short cycle
3.	Metaphor	Guide all development with a simple shared story of how the whole system works
4.	Simple Design	The system should be designed as simply as possible at any given moment. Extra complexity is removed as soon as it is discovered
5.	Testing	Programmers continually write unit tests, which must be run flawlessly for development to continue. Customers write tests demonstrating that features are finished
6	Refactoring	Programmers restructure the system, without changing its behaviour to remove duplication, improve communication, simplify or add flexibility
7	Pair-Programming	All production code is written with two programmers at one machine
8	Collective Ownership	Anyone can change any code anywhere in the system at any time
9	Continuous Integration	Integrate and build the system many times a day, every time a task is completed
10	40-hour week	Work no more than 40 hours a week as a rule. Never work overtime a second week in a row
11	On-site Customers	Include a real, live user on the team, available full-time to answer questions
12	Coding Standards	Programmers write all code in accordance with rules emphasising communication through the code

Table 1. XP Practices (Beck 1999)

	Practices	**Description**
1.	Scrum Master	Responsible for the success of Scrum by ensuring that the values, practices and rules are enacted and enforced. They are the driving force behind all the Scrum practices
2.	Product Backlog	An evolving, prioritised queue of business and technical functionality that needs to be developed into a system
3.	Scrum Teams	Commits to achieving a Sprint goal. They are accorded full authority to do whatever they decide is necessary to achieve the goal
4.	Daily Scrum Meetings	Team comes to communicate daily for a 15-minute status meeting to determine what has been accomplished since the last meeting and what is going to be done before the next including any obstacles that are in the way
5.	Sprint Planning Meeting	Customers, users, management, product owner and Scrum Team determine the next sprint goal and functionality and devises individual tasks that must be performed to build the product increment

6	Sprint	Team works for a fixed period of time
7	Sprint Review	Four-hour informational meeting. Team presents to management, customers, users and product owner the product increment that it has built during the Sprint

Table 2. Scrum Practices (Schwaber and Beedle 2002)

Decision Making

According to Highsmith and Cockburn (2001) "team proximity and intense interaction between team members are hallmarks of all agile methods." A basic principle of agile is that "people can transfer ideas faster by talking face to face than by writing and reading documents. A few designers sitting together can produce a better design than each could produce alone" (Highsmith and Cockburn 2001). Due to the variation of stakeholders involved in any ISD project (traditional or agile-driven), the project team will consist of a cohort of members with diverse interests, perspectives and skill-sets and as a result are undoubtedly subjected "to all the vagaries of group dynamics, interactions, coordination and communication" (Kweku Ewusi-Mensan 1997). This becomes particularly dominant in agile methodologies, which necessitate regular, intense stakeholder interaction and has a significant impact on decision-making. In agile systems development, work is always conducted by a self-managing team (Moe, Dingsoyr and Dybå, 2010) who have "autonomy to make decisions that are traditionally the responsibilities of supervisors and managers" (Alper, Tjosvold and Law, 1998).

CONTRIBUTION BEHAVIOURS

In ISD contributions are of critical importance because the "tacit nature of user requirements, project design specifications and overall project understanding cannot be fully captured in formal documents" (Janz and Prasarnphanich 2009). In agile systems development the practices must be such in that they endorse and encourage contribution behaviours to generate alternatives for decision-making. Effective facilitation of contribution behaviours during decision making will allow for the combination of members' knowledge in generating alternatives to produce higher quality decisions (Michaelsen, Black and Watson, 1989). Contribution has been defined as "voluntary acts of helping others by providing information" (Olivera, Goodman and Tan, 2008). Olivera et al. (2008) study specifically explores individual contributions made across distributed environments where technology is the means of delivering the contribution. For the purpose of this research however, contribution is assessed in the context of generating alternatives for decision-making in inherently interactive co-located agile project team environments.

Contribution behaviour associated with '*searching and matching*' (Olivera et al. 2008) assists in the generation of alternatives for decision making. Searching and matching is where "individuals determine whether and how the knowledge domain of the help request matches their own personal knowledge" (Olivera et al. 2008). In the context of this research, the 'knowledge domain of the help request' relates to the entirety of information required in order for a decision to be made. Searching and matching prevents premature convergence of alternatives during decision-making. Contribution behaviour of searching and matching allows for the thorough exploration of alternatives during decision making thus enabling divergent thinking which according to Goncalo and Duguid (2008) is particularly relevant for achieving quality during the decision making process.

PROPOSED RESEARCH APPROACH

The study aims to assess how contribution behaviours impact the generation of alternatives during decision-making in agile systems development and how agile practices facilitate contribution behaviours. Due to the restrictions of a positivist research approach in its neglect of human behaviour and social factors (which are imperative in this study assessing decision making in highly cohesive agile teams) an interpretative stance will be followed. In addition, having considered the propositions pertaining to qualitative and quantitative research, a qualitative approach is considered most appropriate for this study, as there is little prior research on decision-making in agile practices. There is a need to initially explore the field to extrapolate meaning for which a qualitative approach is best suited.

The intention is to conduct case study research of agile software development teams by conducting one-to-one interviews with project team members. In addition, observation of decision making occurring within agile practices

will be carried out. The case study, as described by Glatthorn and Joyner (2005) is a disciplined inquiry that develops an understanding of a particular subject matter through the use of inductive processes. Case studies are strongly associated with qualitative research as they "allow for the generation of multiple perspectives either through multiple data collection methods or through the creation of multiple accounts from a single method" which can yield detailed understanding of a specific context (Gray 2009). The case study will therefore derive meaning from events and develop knowledge in this research domain. In addition, as this research will occur in the natural setting of cases, there are opportunities for direct observation of team meetings and decision making occurring within specific agile practices. It is anticipated that relevant behavioural observations may give further insight (Yin 2009).

Current Status of the Project

Research to date has reviewed literature on decision making to include models of decision-making, the decision-making process and decision-making quality. In addition, literature on what constitutes contribution behaviour has been reviewed as well as agile systems development with a focus on agile practices associated with XP and Scrum. The research objective and research questions are defined. While case studies are the proposed research methodology, various research instruments utilised to assess contribution behaviour during decision-making are currently being critiqued for their applicability to this study in an agile systems development context. Once specified and pilot tested, data collection for this research will commence. Access has been granted in several organisations (some international) that are willing to participate in the research and are already using agile methodologies.

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